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ABSTRACT

This study addressed the efficacy and outcomes of a U.S. Department of Agriculture Nutrition Education Training (NET) project designed to increase awareness of health risk and wellness factors for grade 9 high school students. The study also considered the empowerment fostered by the program and measured changes in the health and nutrition attitudes and health behaviors of students from grade 8 to grade 9. The curriculum was designed to supplement, not supplant, education on nutrition and health in the schools, using information based on the Dietary Guidelines for America. The NET project took place in 5 high schools in a Tennessee county school system of approximately 17,000 students. A student cohort was randomly sampled on three occasions, Spring of grade 8 (n=131), Fall of grade 9 (n=125), and Spring of grade 9 (n=100), after the NET curriculum. Data indicated that the NET project produced overall positive results for the two measurable nutrition goals and objectives and for the team and community involvement goals. Female students reported an increase in health and nutrition risk habits during the duration of the project, and male students also reported improvements, although there may have been some differences in their perceptions of "high fat foods." Students were apparently more motivated to improve health habits by eating more fruits and vegetables than they were to reduce consumption of high fat foods. Four appendixes contain a description of the wellness curriculum, a list of national health goals, the goals of the NET program, and the pretest and posttest questions. (Contains 7 tables, 4 figures, and 16 references.) (SLD)

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Efficacy, Outcomes, and Empowerment Evaluation of a School District NET Project

Research Brief R-97-078595-00

Marie Miller-Whitehead

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- Author

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Efficacy, Outcomes, and Empowerment Evaluation of a School District NET Project

Introduction

This study addressed the efficacy, outcomes, and empowerment evaluation of a USDA Nutrition Education Training (NET) project designed to increase awareness of health risk and wellness factors of grade nine high school students and to measure changes in their health and nutrition attitudes and health behaviors from the spring of grade eight to the spring of grade nine. The data were a sample at the student, school, and school system level with comparisons to state and national indicators for age and gender with particular emphasis on nutrition habits and health risk by gender. The NET project period was fall of 1996 to spring of 1997.

A mandated pre- and post- survey/test was administered to students with results submitted to the Tennessee Nutrition Education and Training Program, the pretest as a needs assessment and the posttest as a measure of change in students' knowledge, attitudes, and behaviors over the course of the ten month duration of the program. Since the program to be evaluated was designed to be integrated and specifically aligned with the nutrition strand (Figure 1) of the grade 9 Wellness curriculum (Appendix A) and also with the goals of "Healthy People 2000" (Appendix B), students received regular classroom instruction in these areas in addition to that provided by the goals of the NET program (Appendix C). The goals and objectives of the Lifetime Wellness curriculum addressed student knowledge and problem solving skills related to health and risk behaviors while the goals of the NET project and "Healthy People 2000" targeted promotion of positive behaviors associated with Dietary Guidelines for Americans, reduced health risks, longevity, and quality of life.

Insert Figure 1 about here

Results, conclusions, and implications of the study provided information for making decisions to assure accuracy and confidentiality of student responses, appropriate documentation of results for local and state audiences, and program benefits for students, teachers, school, and community.

Review of Related Literature

Many of the NET programs are designed to provide nutrition education to low income or Limited English families, with the majority of participants from Hispanic populations in some areas (Mahassen, 1997). However, there are other populations that are also at significant risk for nutrition related health problems and thus it is important to identify how risk factors are related to demographics and occupation and also to allow program participants to learn to self-assess and provide them with tools for self-improvement. Empowerment evaluation is "designed to help people to help themselves and improve their programs" and is "a collaborative group activity" (Fetterman, Kaftarian, & Wandersman, 1996, p. 5). During the initial or preliminary planning stage deciding upon desired outcomes and goals and what data will be required to measure these outcomes is essential, particularly in a goal oriented model (King, Morris, & Fitz-Gibbon, 1987; Stecher & Davis, 1987). Stecher and Davis identify five approaches to evaluation: experimental,

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goal/objective, decision focused, user oriented, and responsive. To the extent that the NET program had mandated pre- and posttest requirements, the evaluation model was essentially experimental mixed model, with responsive elements part of the designed team approach for school and community stakeholder input. However, to the extent that the assessment instruments were self-assessments for program participants, the evaluation model also could be identified as empowerment evaluation as student participants were asked to reflect upon personal behaviors when responding to pretest and posttest items. Traditional approaches to evaluation have identified formative and summative as the two major objectives of evaluation. The evaluator's task is then to "predict how things might have been had the program not occurred or if some other program had occurred instead" (Fitz-Gibbon & Morris, 1987, p. 5). Experimental evaluations require that outcome and implementation goals be expressed in observable terms which may be cognitive or performance, attitude, behaviors, or community focused such as increasing numbers of participants or promoting stakeholder involvement and feedback (Harrington et al., 1997; Herman, Morris, & Fitz-Gibbon, 1987).

NET program evaluation models are standardized through the NET program and the USDA and are consistent with most widely accepted standards for evaluation (Joint Committee on Standards for Educational Evaluation, 1994); although mechanisms for innovation in development of instructional materials are encouraged the assessment instruments are provided by the program directorate. However, instructional materials developed as components of NET programs have been made available by many of the participating states and school districts, as well as research findings that can be used for comparison purposes and to design activities that will motivate students to become more actively involved in developing healthy nutrition habits (James & Rienzo, 1996; Mahassen, 1997; Murphy, Youatt, Hoerr, Sawyer, & Andrews, 1994; Spoon, Benedict, Leontos, & Krelle-Zeppo, 1998). A study of Michigan students found that all students, particularly older students (grade 11) preferred to learn about nutrition through hands on activities such as food preparation and games and also through videos and other interactive media, but were not interested in learning through projects and were least interested in learning through passive activities (Murphy et al.). The same study reported that funding limitations precluded followup on survey responses to increase response rate.

One concern that emerged involved the particular health and nutrition behaviors of young adolescents and the relative difficulty of improving their nutrition habits when research has consistently found that teens have poorer nutrition habits than do elementary school age students. Some of these behaviors can be traced to more independent decision-making by adolescents who can more easily choose what they eat, to concerns about appearance and body image among adolescent females, to peer pressure, and to making weight required by some athletic programs (Brook & Tepper, 1997; Chapman, Toma, Tuveson, & Jacob, 1997; "Health-risk behaviors...," 1994; Pearman, Thatcher, Valois, & Drane, 2000; Perry-Hunnicutt & Newman, 1993).

According to the Centers for Disease Control, while 17% of age 12-13 year-olds reported consumption of five or more servings of fruit and vegetables daily, that percentage decreased to 13.4% for 14-17 year-olds and to a little more than 10% for 18-20 year-olds. However, consumption of high fat foods was higher for younger persons than for older, with 34% of 14-17 year-olds reporting consumption of at least two servings of high fat foods the day preceding the survey compared to 27.7% for 18-21 year-olds. Findings were that health risks among

adolescents increase rather than decrease with age and recommendations were that interventions take place in grades 8 through 12 ("Health-risk behaviors...," 1994).

Project Goals and Objectives

The NET program is implemented by the states through the USDA and is designed to supplement, not supplant, education on nutrition and health through training programs using one of its recommended deployment models, either the school cafeteria as a learning lab, the grade 9 Lifetime Wellness course, or parent training at Family Resource Centers. The NET goals are based on Dietary Guidelines for Americans. Review of extant literature and research findings indicated that health risk behaviors, including poor nutrition, increase as children get older, beginning at about age thirteen. Therefore, the project focused on students aged thirteen to fifteen, the years when research findings indicate that young teens first begin to neglect nutrition. The results of a 12 item preliminary assessment (Appendix D) conducted in the spring prior to implementation of the NET project indicated that two-thirds of the thirteen and fourteen year old eighth grade students surveyed did not eat at least five servings of fruits and vegetables each day, limit consumption of sweets and snacks, or limit consumption of high fat foods. The same student population also self reported high scores for personal health and fitness, indicating that they did not associate poor nutrition in their adolescent years with the potential for negative health consequences in adulthood (Table 1). Based on NET project requirements as set forth by the Tennessee State Department of Education NET program directorate (Appendix C) as well as data provided by the USDA, the 4H/University of Tennessee Extension Service, and the results of the eighth grade needs assessment survey the project focused on three dietary goals recommended in Dietary Guidelines for Americans:

1. Eat a variety of foods
2. Choose a diet with plenty of grain products, vegetables, and fruits
3. Choose a diet low in fat, saturated fat, and cholesterol

The specific dietary objectives of the NET project were:

1. To increase by 10% the number of grade 9 students who reported that they ate a variety of foods
2. To increase by 10% the number of grade 9 students who reported that they chose a diet with plenty of grain products, fruits, and vegetables
3. To increase by 10% the number of grade 9 students who reported that they chose a diet low in fat, saturated fat, and cholesterol

The NET projects also required a TEAM model implementation, with input from a wide variety of school and community resources (Table 1).

Insert Table 1 about here

The TEAM participation and community involvement goals of the NET project were:

1. To have at least one team member from each high school and from the school district Nutrition Department attend the Orientation session.
2. To provide Lifetime Wellness teachers with professional speakers in the field of nutrition to relate dietary habits to athletic performance, to medical consequences, and to overall future health and well-being, specifically addressing gender issues such as body image.
3. To have each high school cafeteria manager or representative visit each of the Lifetime Wellness classes at least once to obtain feedback on students' cafeteria food preferences and purchasing decisions.
4. To encourage sharing of information by students or parents with classmates affected by such health-related diet issues as diabetes, food allergies, asthma, anorexia nervosa, or bulimia nervosa.

The third goal of the NET project was to provide additional instructional materials such as kits, videos, posters, cookbooks, workbooks, supplies for demonstration cooking projects, and manipulatives to encourage students to do hands-on learning. A survey of the high school libraries, Teachers' Center, and the Family Resource Center indicated a need for up-to-date nutrition related materials for students of various ability levels as the Lifetime Wellness course is required for all high school students. A corollary activity involved development of text selection criteria and formation of a textbook selection committee to make recommendations for Wellness textbook adoptions. The objectives of the third goal were:

1. Survey the school district Teacher Center to determine what county wide resources were available for students and teachers appropriate as ancillary materials across a wide range of ability levels for the Nutrition strand of the Wellness curriculum.
2. Survey high school librarians to determine current holdings on Nutrition at each high school library.
3. Survey Wellness teachers to determine needs and preferences for current ancillary materials appropriate for their school and student population.
4. Survey community agencies such as the University of Tennessee Extension Service, the Medical Center, the county Health Department, the Tennessee State Department of Education, local area universities, and consultants for suggestions for current materials as well as to recruit and schedule speakers and consultants for Wellness classes.
5. Purchase and distribute materials requested by program participants
6. Survey Wellness teachers, librarians, administration to determine usefulness of ancillary materials and perceived value of the project components for each participant school and community agency of the NET project
7. Wellness textbook adoption committee and development of criteria for textbook selection.
8. Publish and disseminate NET project information on the official school district web site.

Quarterly interim expenditure, activity, and participation reports were maintained as a required component of the project. In addition to dissemination of instructional materials through regular correspondence with Wellness teachers information about the project was summarized and

posted on the school system's official web site by the project director as time permitted. This project was the first school district NET project in the state of Tennessee to have a web site.

Research Questions

Research questions were related to project goals and objectives, specifically to objectives for self-reported student nutrition behaviors. Although the objectives were to achieve a 10% increase in healthy nutrition habits of the grade 9 Wellness students, this was quite optimistic given published results of research on adolescent behaviors. The research questions were subsequently framed to permit reporting of significant differences:

1. There is no pretest-posttest difference in percent of students who report that they eat at least five servings of fruits, vegetables, and grain products each day.
2. There is no pretest-posttest difference in percent of students who report that they choose a diet low in fat, saturated fat, and cholesterol.
3. There is no difference by gender in posttest percent of students who report that they eat at least five servings of fruits, vegetables, and grain products each day.
4. There is no difference by gender in posttest percent of students who report that they choose a diet low in fat, saturated fat, and cholesterol.

Needs assessment of grade eight students had indicated several significant differences between male and female students, with a higher percentage of females than males consistently responding that they made healthy food choices. Therefore, it was of interest to determine if these differences by gender had diminished after providing speakers and instructional materials that addressed gender specific nutrition issues for both males and females. An additional research question related to students who reported eating a variety of foods was not included in the statistical analysis as there was not a NET survey item to measure that specific objective. However, the aggregated responses to several other pretest and posttest survey items provided data that could be useful in determining if and to what extent, on the average, students were eating a variety of foods.

Population

This NET project took place in the five high schools of a mid-sized Tennessee county school system of approximately 17,000 students located near a large urban area. Although some schools had large percentages of students at the poverty level, in 1997 the median per capita income of the county was $63,000. Depending upon census sector, many students' families major source of income was from agriculture and farming (beef production), others from corporate employment or employment in the professions, and others from the entertainment industry. The school system was approximately 7% ethnic minority although this varied by census sector and school (Table 2). The average age of the eighth grade student cohort who were surveyed for the project needs assessment was 13 years and 10 months. The average age of the student cohort on the posttest was exactly 15 years, with a minimum of 14 and a maximum of 18.

Insert Table 2 about here

The county Family Resource Center provided ESL services to adults and was provided with media center resources (some in Spanish) as part of this project but no student surveys were conducted at that location since most students regularly attended one of the county high schools. The Family Resource Center provided family support for some of the teen parents also served by the school system.

In several of the schools a subpopulation of students employed in the entertainment industry were overly concerned about personal appearance and weight and some of these also associated regularly with adult abusers of drugs and alcohol, an additional health risk factor for these students making some of them as equally at risk as is traditionally associated with low income inner city teens.

Methodology

The NET program objectives for nutrition education are congruent with the goals of the Dietary Guidelines for Americans. These objectives are aligned within the nutrition strand (Objective 21) of the Tennessee Grade 9 Lifetime Wellness curriculum and also less directly with certain objectives of Healthy People 2000 (Objectives 6, 26, 27). Although the project spanned a one year time frame, the actual nutrition strand of the Wellness curriculum is designed to be completed over the course of two weeks of classroom instruction. However, since the goal of the program was to measure changes in behaviors rather than in knowledge, periodic reinforcement of the benefits of a healthy diet was considered advisable.

A student cohort was randomly sampled on three occasions, spring of grade 8, fall of grade 9 and spring of grade 9. The first random sample of 131 students was surveyed by their teachers in spring of eighth grade. The sample represented approximately 10% of eighth grade students, with one class of at least 25 students selected at random from each of the middle schools in the county system and feeder middle schools in the city system, from classes with an approximately even distribution of male and female students. Although the survey contained 12 items, only 3 project goals were identified and a sample of approximately 130 students was deemed sufficient to determine areas of greatest need (Table 3). Students provided school code, gender, and age but were otherwise not identified and thus no matching of students and responses was possible, although the students' class and teacher could be identified. Although of interest, students were not asked to provide ethnic data as there were so few ethnic minorities in most of the classes surveyed that comparisons would not have been meaningful.

Insert Table 3 about here

A 41 item pretest survey was administered to a random sample of the same cohort of students the following fall at the beginning of their ninth grade, many items similar to those of the longer Youth Risk Behavior Survey. At least 50 students were surveyed from each school (2

Wellness classes) and from these a random sample was drawn of at least 25 students, resulting in a sample of 125 students for the pretest. Due to differences in student enrollment and numbers of grade nine students some schools were oversampled. Students responses were coded by school location but individual students could not be identified and no matching of students and responses was possible. This was to assure students of anonymity as some items required students to provide personal information; every effort was made to assure that students responded honestly to all items on the assessment. Students were also instructed to omit items if they felt the item was too intrusive or if their parents would find it objectionable (some parents, for example, objected to sex education in the Wellness classes). As the survey was administered to each class by the same researcher, all students received the same instructions and the administration procedures were standardized. Because the project addressed specifically designated areas of the Wellness curriculum and all grade 9 students were to participate (Wellness is a required course and there was not a treatment and control group, comparisons were conducted at the cohort level), the program was not required to obtain IRB approval. Based on the scores of the 125 student sample, alpha scale reliability for the 41 item survey was determined to be adequate with a standardized item alpha of .86. An EFA of the 41 item survey was not meritorious as it extracted 14 components and failed to converge, possibly due to sample size. Since only 3 of the items measured stated objectives the extraction of components would have been of interest but was not pursued for measurement of the objectives of this NET project. However, an a priori decision was made to treat the responses to items 1 - 6 as an aggregated score measuring food consumption habits for some of the pre- and post comparisons.

During the semester guest speakers were scheduled at each high school with each addressing the topic of nutrition for teen athletes, adolescent girls, and adult health risk factors related to nutrition, such as colon cancer, diabetes, and arteriosclerosis. Cafeteria managers visited classes to discuss cafeteria food and provide samples of menu items being considered for the school cafeteria. Students also received instruction from their regular classroom teacher. Ancillary materials were purchased and delivered to teachers and to school libraries but in some cases did not arrive in time to coincide with teaching of the nutrition module. The nutrition strand of the Wellness curriculum encompasses approximately two weeks of class time during the school year, thus some activities could not be scheduled during the regular teaching of the Wellness strand. As a result, the posttest survey was administered several months after many teachers had completed teaching the nutrition strand of their Wellness course.

Approximately one semester later, in spring of grade 9, the same 41 item survey was administered as a posttest, again to a random sample of two grade 9 Wellness classes at each of the five high schools from the same cohort of students. Wellness teachers administered this survey to their own classes and thus the posttest conditions were not standardized. Data screening of the pre- and posttest indicated that posttest surveys administered by classroom teachers did not provide consistent information, with gender information missing for 13 of the posttest surveys. Once again, while school, teacher, and class section could be identified, it was not possible to match individual students with responses. The posttest was not administered at one of the high

schools, limiting the number of useable posttest surveys to 100 students (87 with complete information on all the variables) at four of the five high schools.[1]

An additional component of the program consisted of student food journals maintained for the two week duration of the classroom teaching of the Wellness nutrition strand. This provided another opportunity for students to reflect upon nutrition habits, patterns of food consumption, and provided empowerment for students to make wise food choices. In some cases teachers graded students on their journals, in other classes the student journals were suggested but not required.

Results

Overall, male students showed more improvement in their nutrition and health habits over the duration of the NET program than did female students, although female students consistently responded to having more positive nutrition and lifestyle habits on the pretest than male students with the exception of "I develop strength," "I am pleased with the way I look," "I drink several glasses of water each day" and "I have energy to do the things I want to do." Of the 12 indicator survey questions, females responded more positively to 8 of the questions than did males, and males responded more positively to only 3 of the questions than did females (Table 4). Consistent with the literature, in some categories students scored lower on the posttest than on the pretest ("Health-risk behaviors...," 1994). This was more apparent for female students than for male students, however. On the posttest, males had higher means than females on 6 items and females had higher means than males on 6 items (Table 4). The most significant improvement was for grade 9 males who reported consumption of at least 5 servings of fruits and vegetables daily, with a mean score on the needs assessment of .20 and postest mean of .48 and an effect size for the pre- post difference of .83 Females improved only slightly on this indicator, with a mean score on the needs assessment of .24 and a mean posttest score of .26. Percent of males who reported limiting high fat foods to three servings per week improved from a pretest mean of .26 to a posttest mean of .33. For females, the posttest mean score of .33 was lower than their pretest mean score of .38.

Insert Table 4 about here

Tables 5 and 6 show differences between pretest and posttest means for males compared to females and for changes from pretest to posttest for both males and females. On the pretest, females scored significantly higher on an aggregate score of the 6 items than did males, but there was not a significant difference between males and females on the posttest aggregate mean score. There was a significant effect size for improvement for males on the 6 nutrition survey items of .25, while females scored lower overall on the posttest than on the pretest.

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[1]The regular Wellness teacher was ill.

Insert Tables 5 and 6 about here

An additional comparison was available for statewide results of the Tennessee Youth Risk Behavior Survey. The YRBS includes only one survey item (M7) that provides nutrition data similar to that measured by the NET survey. The means for this item for NET participants (I eat 5 servings of fruit and vegetables each day) were more than twice as high as for YRBS grade 9 students. The means for non-nutrition survey items are provided in Table 7.

Insert Table 7 about here

Insert Figures 2 - 4 about here

Discussion

Data from Tables 3 - 7 and Figures 2 - 4 indicates that the NET project produced overall positive results for the two measurable nutrition goals and objectives as well as for team and community involvement goals (Table 1). The generally accepted notion that males are greater risk takers in personal health than females was not borne out by project results. It was apparent that female students self reported an increase in health and nutrition risk habits during the duration of the project while male students self reported improvements. However, there may have been differences between males and females in their perception or definition of "high fat foods" that contributed to the differences on one of the objectives, with females also self reporting more concern over weight and appearance than males and thus possibly more concerned over food ingredients and aware of fat content than males. Although not a project objective, females reported that they exercised less often in grade 9 than did males and the mean score of females who responded positively to "I am pleased with how I look and feel" was lower on the posttest ($\underline{M}$ = .40) than on the pretest ($\underline{M}$ = .57).

Grade 9 students were apparently more motivated to improve health habits by eating at least five servings of fruits and vegetables daily than to limit consumption of high fat foods, which may have been the result of an increase in consumption of fried vegetables or vegetables prepared with ingredients high in fat content, a staple of many Southern menus. Project deadlines and end of school year precluded followup to determine why students had not limited consumption of high fat foods on the posttest.

Although the five school libraries, the Teachers' Center, and the Family Resource Center were provided with a variety of healthy recipe cookbooks in both English and Spanish, many of these were not available for instructional purposes or for students to check out and use prior to the posttest although they were available for use by the next cohort of grade 9 students.

Wellness teachers attended a 2-day orientation meeting to share ideas with other regional participants, the TN NET state coordinator, and the UT Knoxville project coordinator as well as one full day of county inservice and 2 three hour inservice sessions supported by project funding.

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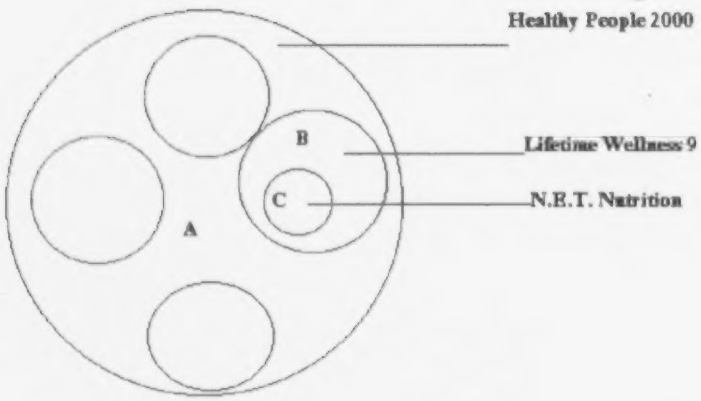


Figure 1. Conceptual framework of nested design of NET Nutrition project within the goals and objectives of Healthy People 2000 and the Tennessee Lifetime Wellness curriculum for grade 9

Table 1

NET Outreach by Category

Category	N (Direct contact)
High Schools	5
Grade 9 Students	1840
Wellness and Nutrition Teachers	12
Community Agencies	7
Consultants (Medical Centers, Health Department)	6
Administrators (Central office, Schools)	10
Libraries/Librarians (including FRC learning center)	6
Teachers Center (available to public, private, and home schools)	1
Universities	3

Note. This table refers only to direct contact. Indirect contact includes availability of materials to all teachers and students served by each high school library, the Teachers' Center, and the Family Resource Center.

Table 2

Demographics of Participating High Schools (All Students, 9-12)

	N White	N Black	N Hispanic	N Asian
School A	618	1	0	4
School B	1463	325	26	7
School C	976	114	11	4
School D	1540	44	12	44
School E	1327	66	14	18
Total	5924	550	63	77

Table 3

Means and Standard Deviations for Grade 8 Needs Assessment

Variable	All (n =131)		Males (n = 64)		Females (n = 67)	
	M	SD	M	SD	M	SD
I limit hi-fat foods to 3 servings/week	.33	.47	.23	.43	.42	.50
I limit salt and sodium, do not add salt to food	.39	.49	.25	.44	.52	.50
I eat more fish, poultry than red meat	.34	.48	.25	.44	.43	.50
I eat 5 servings of fruit, vegetables/day	.22	.42	.20	.41	.24	.43
I limit sweets, snacks, sodas to 2 or 3 per week	.29	.46	.23	.43	.34	.48
I drink several glasses of water each day	.64	.48	.55	.50	..73	.45
I am normal weight for age/height	.78	.42	.77	.43	.79	.41
I keep in shape, exercise 30 minutes at least 3 x week	.70	.46	.70	.46	.69	.47
I stretch, stay supple	.63	.49	.53	.50	.72	.45
I develop strength, do strength activities regularly	.75	.43	.86	.35	.65	.48
I am pleased with how I look & feel	.73	.44	.86	.35	.61	.49
I have energy to do things I want to do	.95	.21	.98	.13	.93	.26

Note. Respondents ranged in age from 13 to 16 years, with average age of 13 years, 10 months.

Table 4

Means, Standard Deviations, and T-Tests for Pretest and Posttest by Gender

	N.E.T. Pretest						N.E.T. Posttest					
Variable	Male n = 57		Female n = 68		t-test		Male n = 29		Female n = 58		t-test	
	M	SD	M	SD	t	Sig	M	SD	M	SD	t	Sig
I limit hi-fat foods to 3 servings/week	.26	.44	.38	.49	-1.41	.160	.28	.45	.33	.47	-.49	.628
I limit salt and sodium	.12	.33	.44	.50	-4.11	.000	.17	.38	.40	.49	-2.14	.035
I eat fish, poultry more than red meat	.34	.48	.50	.50	-1.81	.073	.28	.45	.43	.50	-1.41	.163
I eat 5 servings of fruit, vegetables/day	.14	.35	.22	.42	-1.11	.271	.48	.51	.26	.44	2.12	.037
I limit sweets, snacks, sodas	.13	.33	.29	.46	-2.30	.023	.10	.31	.28	.45	-1.85	.068
I drink water	.63	.49	.63	.49	-.01	.993	.55	.51	.60	.49	-.48	.649
I am normal weight for age/height	.75	.43	.82	.38	-.94	.347	.62	.49	.67	.47	-.47	.637
I keep in shape	.70	.46	.75	.44	-.60	.550	.79	.41	.71	.46	.85	.396
I stretch, stay supple	.49	.50	.69	.47	-2.30	.023	.45	.51	.36	.48	.77	.443
I develop strength	.67	.48	.51	.50	1.72	.087	.72	.45	.55	.50	1.56	.123
I am pleased with how I look & feel	.72	.45	.57	.50	1.70	.092	.76	.44	.40	.49	3.35	.001
I have energy to do things I want to do	.93	.26	.91	.29	.37	.714	.76	.44	.71	.46	.50	.616

Note. T-tests were conducted at the 95% confidence interval. Average age of grade 9 students on the pretest was 14.5 years and on the posttest was 15.

Table 5

Aggregate NET Pretest and Posttest Means for Males and Females

	Pretest Mean	SD	Posttest Mean	SD	ES
Males	1.5893	1.1083	1.8621	1.0255	.25
Females	2.4706	1.4708	2.2931	1.3766	-.12

Note. Aggregate nutrition score is based on positive response to questions 1 through 6, although only 2 items were NET project objectives (Appendix D).

Table 6

Differences in Means by Gender on Aggregate Pretest and Posttest

		Mean	t	Sig
Pretest	Male	1.59	-3.701	.000
	Female	2.47		
Posttest	Male	1.86	-1.490	.140
	Female	2.29		

Note. Aggregate is the total score for questions 1 - 6 (Appendix D).

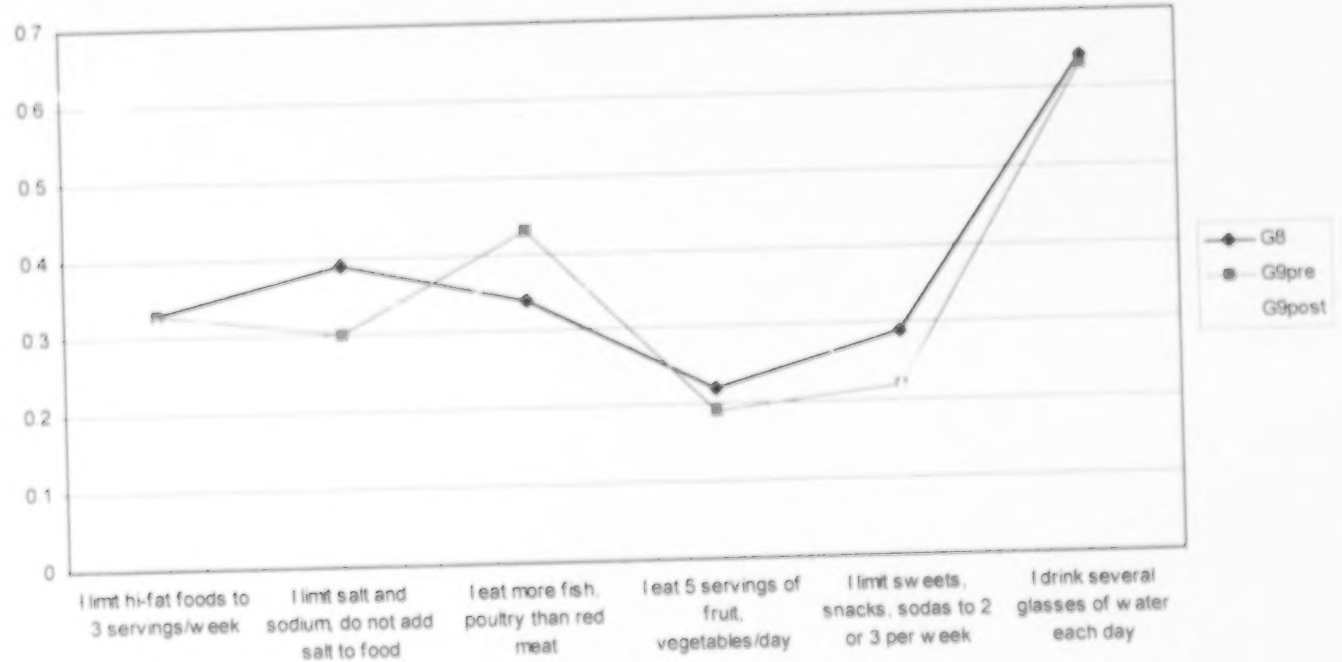
Table 7

Comparison of Selected TN YRBS and NET Participant Responses

	TN YRBS Grade 9 %		NET Posttest Grade 9 %	
Variable	Males	Females	Males	Females
	M	M	M	M
I eat 5 servings of fruit, vegetables/day	16	16	48	26
I am normal weight for age/height	77	61	62	67
I keep in shape by exercising at least 3 x per week	79	66	79	71
I don't use tobacco	75	76	76	74
I don't use alcohol	30	28	59	67
I don't use drugs or marijuana	60	70	76	84
I don't ride with drinkers	66	70	76	78
I do wear seat belt	70	86	76	67
I do wear bike/motorcycle helmet when I ride	54	-	17	29
I know how to prevent STD, HIV/AIDS	94	92	90	97

Note. For comparison purposes the inverse of negatively worded YRBS questions are provided. YRBS refers to the Tennessee Youth Risk Behavior Survey. YRBS data include samples from all Tennessee public schools except Metropolitan Davidson County.

Figure 2. Summary of student responses to nutrition behaviors for each of three nutrition surveys.



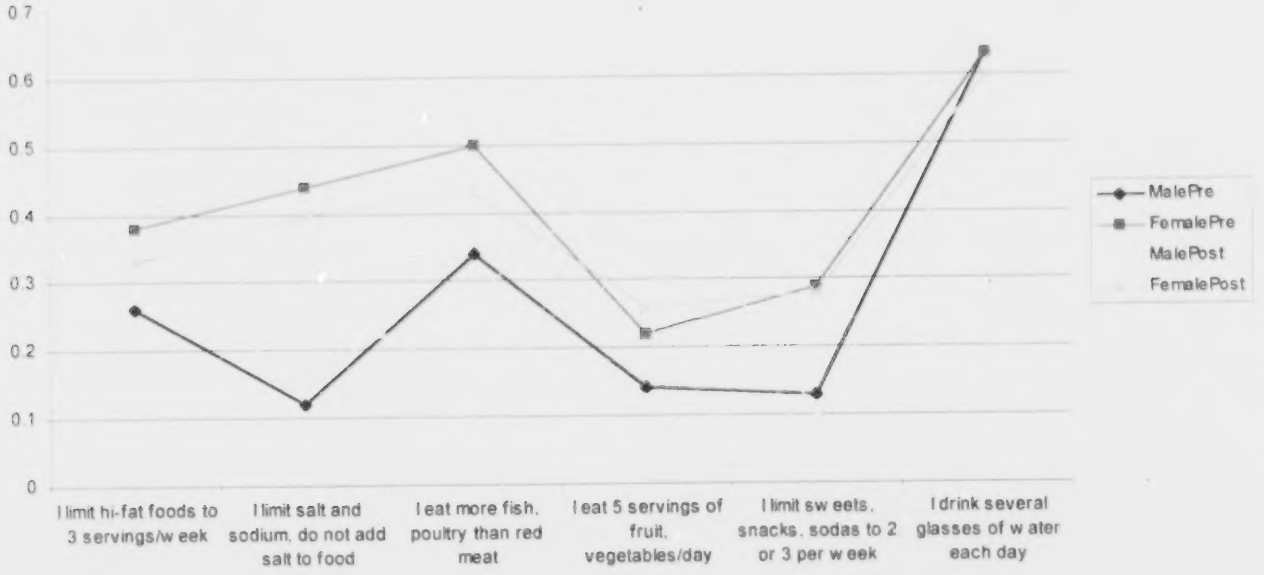


Figure 3. Pre- and posttest student responses by gender for grade 9 nutrition behaviors

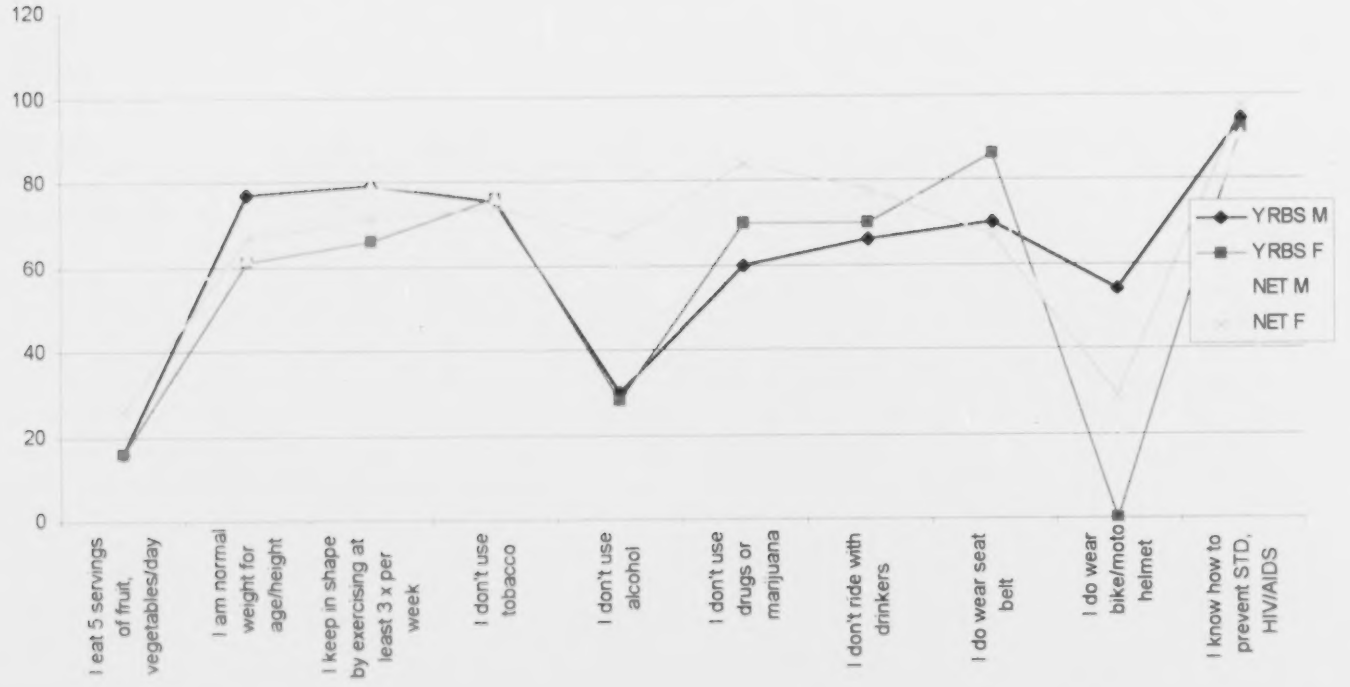


Figure 4. Comparison of YRBS and NET grade 9 student responses on like indicators.

Appendix A

Nutrition Strand Grade 9 Tennessee "Lifetime Wellness" Curriculum[2]

Course Goal: Understand the relationship of sound nutrition to total lifetime wellness

Terminal Objective: The student will be able to:

19. Explain personal nutrient and energy needs
20. Demonstrate understanding of nutrient and energy needs at various stages of the life cycle, including:
    a. Pregnancy
    b. Infancy
    c. Adolescence (including the topics of weight control and eating disorders)
    d. Adulthood (early, middle, and senior years)
21. Explain the role of the dietary guidelines for Americans as a foundation for maintaining healthy eating.
22. Assess personal dietary practices by comparing daily consumption of foods from each of the categories in the Food Guide Pyramid to the recommended number of servings and determine any needed adjustments.
23. Practice principles of food safety involved in food storage, cooking, and sanitation
24. Accurately interpret information provided on food labels.
25. Identify professional sources of information about food and nutrition.
26. Demonstrate the ability to make informed consumer decisions in regard to food and health related selections.
27. Describe personal changes that can be made in order to choose a healthful eating pattern in the face of environmental forces which encourage unhealthy eating patterns.

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[2]Source: Lifetime Wellness Curriculum Writing Committee (1994). Course #3303. Nashville: Tennessee Department of Education.

Appendix B

"Healthy People 2000" National Health Goals[3]

1. Increase the proportion of people who do regular physical activity for cardiovascular fitness
2. Increase the proportion of people who do regular physical activity for strength, muscular endurance, and flexibility
3. Decrease the proportion of people who do no leisure-time physical activity
4. Reduce the prevalence of overfatness and increase physical activity among those who have excess body fatness
5. Reduce the proportion of male high school seniors who use anabolic steroids
6. Reduce dietary fat, especially saturated fat intake
7. Increase the complex carbohydrates in the diet
8. Increase the calcium intake in the diet
9. Decrease the salt and sodium in the diet
10. Reduce the incidence of iron deficiency
11. Increase the proportion of people who use food labels
12. Increase the span of a healthy life
13. Reduce coronary heart disease deaths
14. Reduce cholesterol levels among adults
15. Reduce the incidence of overweight adults
16. Reduce the proportion of adults with high blood pressure
17. Reduce stroke deaths
18. Reduce the incidence of deaths from diabetes
19. Reduce the incidence of chronic back conditions
20. Reverse the rise in cancer deaths
21. Reduce the prevalence of mental disorders
22. Reduce the adverse health effects of stress
23. Reduce the suicide rate
24. Reduce hip fractures among older people
25. Reduce hospitalization from asthma
26. Reduce overfatness to no more than 20 percent of people aged 20 or more
27. Reduce overfatness to no more than 15 percent of people aged 12 - 19
28. Increase to 50 percent the proportion of overfat people who have adopted physical activity and sound nutrition to attain desirable body fatness
29. Increase the proportion of people who do lifetime physical activity

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[3]Healthy People 2000: National Health Promotion and Disease Prevention Objectives. (1991). U. S. Department of Health and Human Services, Public Health Service. Washington, D.C.: U. S. Government Printing Office.

Appendix C

Goals of the Nutrition Education Training Project (NET)[4]

Participants in the NET project for fiscal year 1995-1996 selected 3 of the following as the project goals based on results of needs assessments conducted in spring of 1996:

Dietary Guidelines:

1. Eat a variety of foods
2. Balance the food you eat with physical activity. Maintain or improve weight
3. Choose a diet with plenty of grain products, vegetables, and fruits
4. Choose a diet low in fat, saturated fat, and cholesterol
5. Choose a diet moderate in sugars
6. Choose a diet moderate in salt and sodium
7. If you drink alcoholic beverages, do so in moderation

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[4]Source: TN Nutrition Education & Training Program. (1996). Nashville: Tennessee State Department of Education.

Appendix D

Pretest and Posttest Summary Questions
NET Wellness Self-Assessment[5]

Section 1: Nutrition

Q1. I limit my consumption of high-fat foods to 2-3 times per week
Q2. I limit my consumption of salt and salty foods and do not salt my foods.
Q3. I eat fish and poultry more often than I eat red meat.
Q4. I eat 5 servings of fruits and vegetables a day.
Q5. I limit my intake of sweets, sodas, and snack foods to 2-3 times per week.
Q6. I drink several glasses of water a day.

Section 2: Fitness

Q1. I am within the normal weight range for my gender, height, and age.
Q2. I keep in shape by doing vigorous exercise for at least 30 minutes 3 times a week
Q3. I stretch, do yoga, or move my body regularly to keep it supple and flexible.
Q4. I regularly engage in activities that develop overall strength.
Q5. I am pleased with the way I look and feel.
Q6. I have enough energy to do the things I like to do.

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[5]Source: TN Nutrition Education & Training Program (1996). Nashville: Tennessee State Department of Education.